MULTIMEDIA COMPLIANCE/POLLUTION PREVENTION ASSESSMENT GUIDANCE FOR LITHOGRAPHIC PRINTING FACILITIES

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CHAPTER 1

PRINTING INDUSTRY OVERVIEW

The printing industry is a very diversified industry composed of firms who perform printing as well as firms who render services for the printing trade, such as platemaking and bookbinding. The industry also includes firms engaged on publishing newspapers, books, and periodicals (regardless of whether they do their own printing). Many firms, though not classified as part of the printing industry, perform printing and related activities. These include firms performing textile printing; manufacturers of products, especially packaging, that contain incidental printing; and manufacturers of printed circuit boards.

The total number of printing establishments in the United States is estimated to be approximately 100,000. While the industry accounts for a significant portion of the nation's total volume of goods and services, it also represents the largest group of small businesses in the domestic manufacturing sector. Most printing plants employ fewer than 20 people and serve local or regional markets.

The definition of the printing industry is based primarily on the Bureau of the Census' definition as set forth under Standard Industrial Classification (SIC) Code Major Group 27—Printing, Publishing, and Allied Industry. Major Group 27 is comprised of firms engaged in printing by one or more common processes, such as lithography, letterpress, flexography, gravure, and screen printing, as well as those entities that perform printing related services, such a bookbinding, typesetting, and photoengraving. It also encompasses firms who publish newspapers, books, and periodicals.

The SIC subgroups under 27 include the following:

271 - Newspapers
272 - Periodicals
273 - Books
274 - Miscellaneous (e.g., atlases, maps, calendars)
275 - Commercial Printing

276 - Manifold business forms
277 - Greeting cards
278 - Blankbooks, Looseleaf Binders, and Bookbinding and Related Work
279 - Service Industries for the Printing Trade (typesetting, platemaking and related services)

As shown in the above listing, those entities primarily involved in printing fall into SIC subgroup 275 (Commercial Printing).

1.1 Printing Processes

The five most common printing processes in order of market share are lithography, gravure, flexography, letterpress, and screen printing. The printing processes are distinguished by the method of image transfer and by the type of image carrier (or plate) employed. Printed images are transferred to the substrate either directly or indirectly. A substrate is any material upon which ink is pressed. Direct printing processes are gravure, flexography, letterpress, and screen printing. In direct printing, the image is transferred directly from the image carrier to the substrate. In indirect (or offset) printing, the image is first transferred from the image carrier to an intermediate cylinder called a blanket cylinder and then to the substrate.

Two kinds of presses used in printing are categorized by the form of paper or other substrate (medium) used. *Web presses*, which are used for larger printing runs, print the image onto a continuous roll (web) of paper. After printing, the paper is then cut and trimmed to the proper size. *Sheet-fed presses* print on individual sheets. A discussion of individual printing processes, and the products associated with those processes, is presented below:

- **Lithography** is the predominant printing process in the U.S., and accounts for approximately 50% of all printing applications. Sheet fed lithography is used for printing books, posters, greeting cards, labels, packaging, advertising flyers, brochures, periodicals, and for reproducing artwork. Web offset lithography is used for periodicals, newspapers, advertising, books, catalogs, and business forms.

- **Gravure** printing is used for large volume runs and high speed runs for printing high-quality publications, magazines, catalogs, and advertising. It also has large volume applications in the printing of flexible packaging, paperboard boxes, and labels.

- **Flexography** is a form of letterpress that uses a flexible plastic or rubber plate in a rotary web press. Flexography is used primarily for packaging (plastic wrappers, corrugated boxes, milk cartons, foil, and paper bags), and for imprinting large surface areas. The use of flexographic printing techniques has increased with the amount of packaging used in the U.S.

- **Web letterpress** is used for some printing of newspapers and magazines, however, its use is declining as the use of lithographic printing increases. Sheet-fed letterpress is used for some books, printed stationery, announcements, business cards, and advertising brochures. Because individual changes can be made on a plate without having to redo the entire plate, letterpress is particularly useful for price lists, parts lists, and directories.

- **Screen printing** can print on virtually any substrate, including wood, glass, fabrics, plastics, and metals. It is used for specialty printing such as T-shirts, posters, banners, decals, and wallpapers. This type of printing makes up a small but growing segment of the printing industry. Screen printing is also used to print patterns on electric circuit boards prior to etching.

The principal raw materials used in the printing industry are inks and substrates. Other raw materials used by the industry include gravure cylinders, photographic films, photoprocessing chemicals (developers, fixers, wash baths, reducers, and intensifiers), printing plates, plate processing chemicals, fountain solutions, cleaning solvents, and rags.

1.2 Process Description

Each of the printing processes can be divided into three major steps: prepress, press, and postpress. Prepress operations involve a series of steps during which the idea for a printed image is converted into an image carrier (i.e., printing plate, cylinder, or screen). Photoprocessing chemicals and solutions are the major types of chemicals used during prepress operations. Press, the actual printing operations, involve inks and cleaning solvents. The possible constituents in

Table 1. Printing Ink Constituents and Potentially Regulated Constituents[1]

Vehicles / Varnishes	**Commonly Used Chemical Formulations**
Rosin ethers	Rosin and pentaerythritol
Long-oil alkyd	Phthalic anhydride and glycerol
Phenolic resin	Phenol and formaldehyde
Hydrocarbon resin	Ethylene, butadiene and indine
Modified resin	Maleic acid and maleic anhydride
Waxes	Natural and synthetic
Mineral oils	Natural and synthetic
Soya /vegetable	Linseed, tall, soybean and safflower oils
Resin / solvent varnishes	Variety of hydrocarbon solvents
Drying oils	Alkyd, urethanes and phenolic resins
Urethanes	Toluene diisocyanate and trimethylol propane
Pigments	
Organic Pigments:	
Carbon black	Graphite
Organically derived pigments:	Benzene, Naphthalene and Anthracene derivatives
Rhodamines	
AZO pigments	
Inorganic Pigments:	
Cyan blue and green shade cyan	Copper Phthalocyannine
Whites	Calcium carbonates, clays and titanium dioxide
Yellows	Lead, chromium
Reds	Barium
Solvents	
Aliphatic hydrocarbons	Parafins
Aromatic hydrocarbons	Benzene
Alicyclic hydrocarbons	Cycloparafins, terpenes
Co-solvent mixtures	Alcohols and hydrocarbons

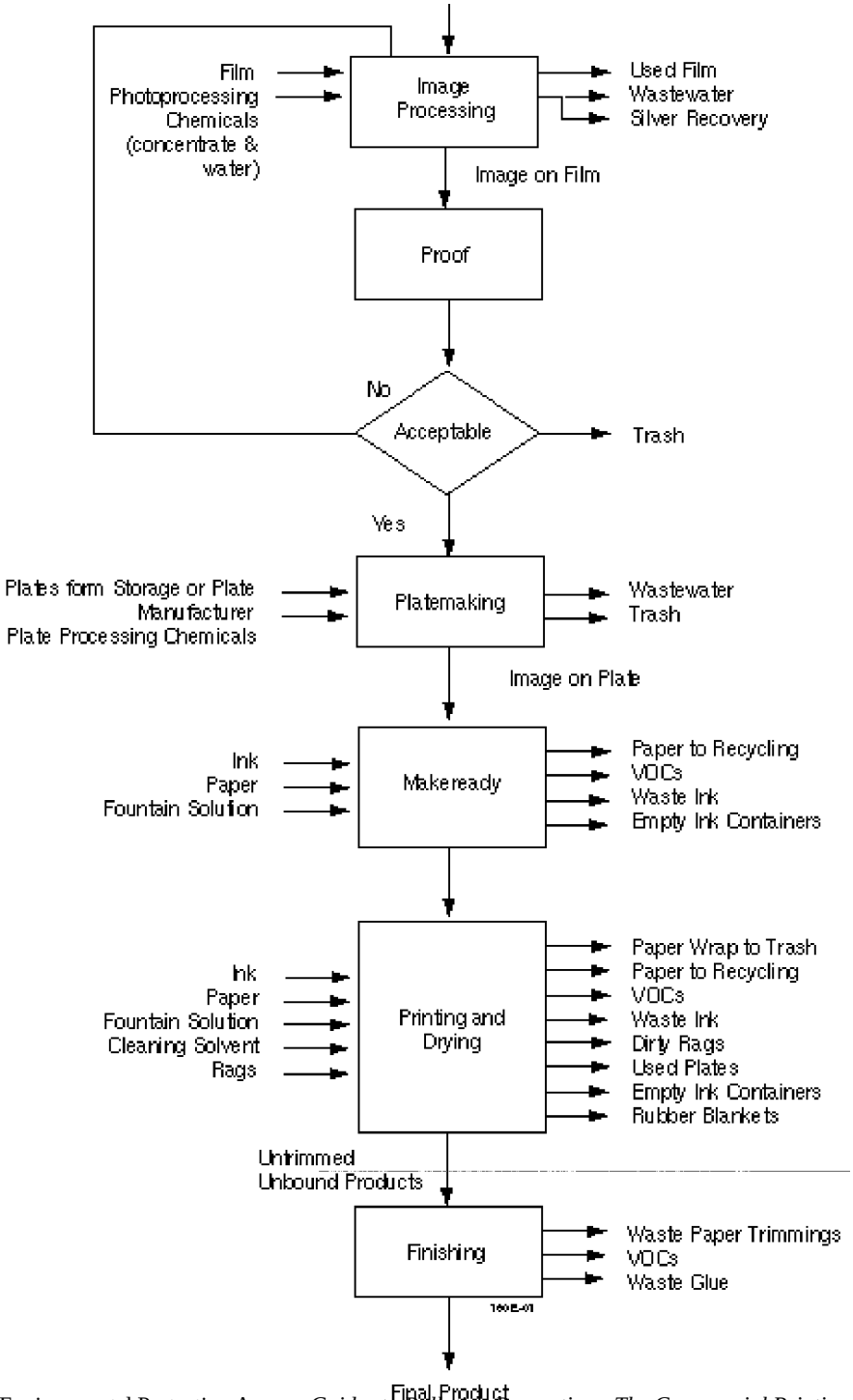
* Information for this figure derived from Chemistry For the Graphic Arts, Ellred, 1992. Environmental Law Index to Chemicals.

[1]Taken from University of Northern Iowa. Iowa Waste Reduction Center, 1995. *Pollution Prevention Manual for Lithographic Printers.*

printing inks are shown in **Table 1**. Postpress involves the assembly of printed materials and consists of binding and finishing operations. Large amounts of adhesives are often used in the production of books and directories.

Figure 1 illustrates the steps involved in a typical offset lithographic printing operation. Printing begins with the preparation of artwork or copy, which is photographed to produce an image. A proof is made which is then used to compare with the printed product and make adjustments to the press. The photographic image is transferred to a plate. In the platemaking

step, the image areas of the plate are made receptive to the ink. In the printing step, ink is applied to the plate, then transferred to a rubber blanket and then to the substrate.



Adapted from U.S. Environmental Protection Agency *Guides to Pollution Prevention - The Commercial Printing Industry* (EPA/625/7-90/008), August 1990.

Figure 1. General Flowsheet for Lithographic Printing Artwork, Copy, or Other Image

The substrate accepts the ink, reproducing the image. The substrate is then cut, folded, and bound to produce the final product. Printing can generally be divided into five steps: (1) image processing; (2) platemaking; (3) makeready; (4) printing; and (5) finishing. Each of these steps is discussed in greater detail below.

1.3 Image Processing

Most printing operations begin with art and copy (text) preparation. Once the material is properly arranged, it is photographed to produce transparencies. If an image is to be printed as a full color reproduction, then color separations are made to provide a single-color image or record which can then be used to produce the single color printing plate. (Multi-color printing is done by passing the substrate through several single-color printing operations.) Once the film has been developed and checked for accuracy it is sent to the plate- or cylinder-making operation.

The printing industry employs photography in the reproduction of both artwork and copy. The materials used include paper, plastic film, or glass base covered with a light sensitive coating called an emulsion. This emulsion is usually composed of silver halide salts. (Silver halides include silver chloride, silver bromide, and silver iodide.)

After a photographic emulsion has been exposed, it must be developed. The exposed emulsion is immersed in a developer, which converts the silver halides to metallic silver on the film. Developers typically contain benzene derivatives, along with an accelerating agent (to speed up the developing process), a preservative (to reduce oxidation damage to the developer), and a restrainer (to prevent image "fogging").

The developing action is stopped by a fixing bath. Each time a photographic image is immersed in a fixing bath, a small amount of silver enters the bath from the emulsion. Insoluble compounds that are formed after the silver concentration reaches a certain level cannot be removed from the emulsion, so the fixer must be diluted prior to reaching this level. The critical silver concentration for fixing baths is 0.27 ounces per gallon (2 grams/liter).

After the image has been fixed to the emulsion, it is washed to prevent residual chemicals from reacting and damaging the image. Washes are usually water, with a temperature of 80°F, and a pH of 4.9 or higher. In some photoprocessing, chemicals are applied to the emulsion to reduce or increase the image contrast. Reducers act by oxidizing some of the silver; intensifiers add silver or mercury to the developed silver grains in the emulsion. A proof is produced after the image processing step as a part of internal job control. The proof shows whether all the elements are in line, whether the color is right, and how the job will look when it is printed. Press proofs (used in multi-color printing) are more expensive because they require a press and printing plates and cylinders. Press proofs are used with gravure and letterpress printing because the platemaking and cylinder-making steps will affect tone reproduction. Off-press proofs, also used for color printing, are usually produced photographically and are used to check camera and scanner separations and corrections.

Image processing wastes typically include spent developer, spent fixer, contaminated wash water, silver, waste paper, and associated photodeveloping chemicals.

An example of innovative technology in image processing is the electronic prepress, or computer image processing. The objective of this technology is to use computer systems to electronically construct a completely digital master copy. Text can be prepared using a computer to create disk files, page layout, graphics and typesetting, while images can be scanned in or created with digital cameras. The digital cameras digitize the image and store it or send it to a computer for editing or enhancement.

1.4 Plate Processing

Printing involves the use of an image carrier, that is a plate or cylinder that accepts ink off a roller and transfers the image to a rubber blanket. The blanket, in turn, transfers the image to the substrate. The type of ink and press used, number and speed of impressions that can be generated, and the characteristics of the image are all determined by the type of image carrier.

The types of image carriers include the following:

- **Photomechanical plates**—these image carriers use light sensitive coatings on which images are produced photographically. Photomechanics is capable of reproducing photographs and other pictorial objects. This is the most common form of platemaking.

- **Electrostatic plates**—an electrophotographic camera converts an image to a lithographic plate used in a copier/duplicator. Electrostatic plates are also used for laser platemaking and newspaper printing.

- **Mechanical plates**—used mainly for relief printing where either a hot metal or duplicate plate is etched or engraved. Mechanical plates are used for paper currency, certificates, textiles, wallpaper, and plastics.

- **Manually set plates**—hand set composition, wood cuts, linoleum blocks, copperplate or steel-die engravings that are seldom used except for screen printing.

In lithographic printing, plates have image and non-image areas on the same plane with the image areas being ink-receptive and the non-image areas being water-receptive. This is possible through a chemical change on the coated plate surface, resulting from a photochemical process in the light sensitive coating. Many printing facilities use pre-sensitized plates, where the light sensitive coatings are applied by the manufacturer. Three methods used to make lithographic plates are the following:

- **Surface plates**—These plates have a light-sensitive coating that becomes ink-receptive when exposed. In additive plates, the hardened areas become ink-receptive through the addition of an oleophilic resin contained in an emulsion developer. Chemicals used in this process are described below:

  - Light-sensitive materials in coatings include azide compounds, hydrazine derivatives, quinone diazides, and quinone esters.

  - Emulsion developer has a solvent phase containing oleophilic resin and pigment and a water phase containing gum arabic and acid.

  Aluminum or anodized aluminum is often used for lithographic surface plates.

- **Deep-etch plates**—In these plates, the coating in the exposed non-image areas hardens, while the unexposed image areas are soft. A developing solution washes the image area away and the stencil remains. Chemicals used in this process are described below:

  - Developing solutions are generally calcium, zinc, or magnesium chloride combined with a mild acid.

  - Image area is plated with copper and/or coated with lacquer (polyvinyl chloride, polyvinyl acetate, and malic acid).

  - Non-image areas are treated with a desensitizing etch and gummed with gum arabic solution.

  These plates are generally not used because of cost, heavy metal toxicity, and wastewater discharge problems.

- **Bimetal plates**—These plates have a long lifetime because the image and non-image areas are composed of two different metals. These plates are also generally not used because of metal toxicity and wastewater discharge problems.

An example of innovative technology in printing processes is the waterless system. In this system, plates are made of unanodized straight-grain aluminum coated with a light-sensitive photopolymer layer followed by a thin silicone rubber layer. The rubber layer causes ink to be repelled from the non-image area. The top layer of the plate is a thin transparent film that is not removed during exposure. The plates are exposed to ultraviolet (UV) light in a vacuum frame, where the UV light activates the photopolymer, breaking its bond with the silicon. After exposure, the protective cover film is removed and the plates are processed in a special processor or by hand. The waterless plate processor uses two specialized chemicals and tap water as the developer. The developer contains a blue dye solution which is used only on the surface of the plate and never discharged. In this process, a minimal amount of solution (i.e., 5 gallons) can process 1,000 to 1,200 40-inch plates. The combination of silicone/photopolymer allows the plate to print without water, etches or alcohol.

Typical plate processing wastes include alkalis, solvents, plate coatings (dyes, photopolymers, binders, resins, pigments, organic acids), plate developers (isopropanol, gum arabic, lacquers, caustics), wastewater (i.e., rinse water) and used plates.

1.5 Makeready

Makeready refers to the last pre-printing step, where all the preparations are assembled and tested prior to the printing run. In the makeready process, the inks, colors, plates, and other preparations are put on the printing press and a small batch is run to ensure that everything is in order. After the makeready run is completed, the product can be inspected, and any adjustments to the press, colors, or plates can be made.

Makeready is the process that produces the largest amount of waste, mostly in the form of paper and ink. This is due to the need to print any number of small runs to obtain the precise alignment, color combination, and other requirements prior to commencing the printing run. Other wastes generated in this process include volatile organic compounds (VOCs) and empty ink containers.

1.6 Printing

After the plates have been prepared, printing can begin. Printing operations are generally the same for each of the major processes (except screen printing). Preparation for printing begins with attaching the plate cylinder to the press. Virtually all presses print from a cylinder, as opposed to a flat plate. Each unit of a printing press prints a single color. To print a full color illustration, units for magenta, cyan, yellow, and black are required.

After the plate has been attached to the cylinder, it is mechanically rotated and the non-image area is treated with an ink-repelling solution. The plate is then coated with the ink, which adheres only to that portion of the plate that contains the image. As the plate continues to rotate, the inked image is transferred to the rubber blanket and then to the substrate. The two major

forms of substrate in lithography are single sheets of paper (sheet-fed) and continuous rolls (web). After printing, the substrate may pass through a drying operation depending upon the type of ink used.

Typical printing wastes include: waste paper from off-specification printing runs, ink, rags, solvents, wastewater from press washing, and miscellaneous printing chemicals.

1.7 Finishing

Finishing refers to the final treatment and handling of the product prior to delivery to the client. Depending upon the requirements of the print run, finishing may involve only trimming the excess paper from a web-press run, to laminating and heat treating a full color poster. Typical finishing activities may involve any or all of the following steps: collating, binding, trimming, embossing, flocking and die-cutting. Finishing also refers to any one of a variety of treatments used on printed goods, including lacquers, waxes, and laminating.

The primary wastes involved in the finishing process include VOCs and waste paper. VOCs are released during the drying process as the solvents contained in the inks volatilize and escape into the atmosphere. Common solvents include benzene, toluene, naphthalene, acetone, and alcohols. Waste paper is produced during the cutting, trimming, and final production. Printing overruns also contribute to the waste paper stream. Ancillary wastes generated during the finishing process may include scrap glues, fabrics, plastics, and laminates.

CHAPTER 2

ASSESSMENT PROTOCOL

The primary purpose of the multimedia assessment protocol for printing facilities is to determine compliance with regulations that apply to air emissions, hazardous wastes, industrial wastewater and the use of toxic substances associated with printing processes. Determination of compliance with any regulations that are not specifically associated with any of the printing processes (e.g., the TSCA regulations on PCBs) is not part of this assessment protocol. The assessment protocol also focuses on encouraging pollution prevention and innovative technology by identifying potential pollution prevention and innovative technology opportunities that could move the facility beyond compliance to overall improved environmental quality.

The multimedia assessment will utilize a process-based approach in which the inspector identifies noncompliance with any applicable media or program specific regulation (air, water, solid waste) as well as pollution prevention and innovative technology opportunities as part of the assessment of individual printing processes.

This assessment protocol serves as a reference for the conduct of these assessments, and includes procedures, an assessment checklist, and an example assessment report. It focuses on *lithographic* printing facilities only, and addresses prepress (image processing and platemaking), press (makeready and printing), and postpress (finishing) operations. An overview of lithographic printing processes is contained in Section 1 of this guidance.

The following activities are part of the multimedia compliance assessment protocol:

- Pre-assessment preparation
- On-site activities
  - Opening conference/discussion
  - Facility walk-through
    - -- Materials storage area

    - -- Process areas
    - -- Waste management areas
    - -- Records/permits/documentation review
  - Closing conference/discussion
- Preparation of assessment report
- Follow-up activities.

Each of these activities is briefly described in the assessment procedures discussed below.

During this multimedia compliance assessment, the inspector should generally follow procedures outlined in EPA Basic Inspector's Training Manual.

Pre-Assessment Preparation

The inspector should review any existing information on the facility including any previous noncompliance problems, and determine whether the facility is in a non-attainment area. Using the available information, he/she should complete Section I, General Facility Information, of the Assessment Checklist which covers general aspects of the regulatory programs to be covered during this assessment (i.e., air, hazardous wastes, wastewater, and use and releases of toxic substances). This information can then be verified during the assessment.

Prior to an assessment, the inspector should become familiar with lists such as (1) the EPCRA list of extremely hazardous substances and their threshold planning quantities, (2) the CERCLA list of hazardous substances and their Superfund reportable quantities, and (3) the EPCRA list of toxic chemicals. Because these lists should also be available for reference (if necessary) during an assessment, the inspector should carry a copy to the facility at the time of the assessment.

On-site activities

- **Opening conference/discussion**—During the opening conference/discussion, it is important that the inspector point out that, in addition to the more traditional objective of compliance evaluation, the assessment focuses on providing compliance assistance

to the facility and identifying potential pollution prevention and innovative technology opportunities. Thus, assessment questions will address raw materials used, housekeeping procedures and process modifications as well as wastes generated.

The inspector should verify the information in Section I, General Facility Information, of the checklist and obtain any missing information. These questions are intended to obtain an overall general evaluation of the regulations that apply to the facility (including whether the facility currently has any permits). In addition, the printing processes at the facility should be discussed, and a schematic prepared.

- **Walk-through of facility**—The Assessment Checklist is designed to walk-through the facility in a process-oriented manner, addressing these activities sequentially:

  - General housekeeping/materials storage (including raw materials information)
  - Image processing
  - Platemaking
  - Printing
  - Cleaning activities
  - Waste handling and management.

For each of these areas, applicable media-specific compliance questions and pollution prevention, innovative technology and recycling questions are included in the checklist.

General Housekeeping/Materials Storage

General housekeeping/materials storage is a separate section of the checklist, although evaluation of these activities should be ongoing throughout the assessment of the facility. Specifically, the inspector should be observing operation and maintenance and housekeeping throughout the facility walk-through in the storage areas, process areas, and waste management areas. The walk-through of the facility should begin at the receiving area and storage area for raw materials.

Image Processing, Platemaking, Printing, Cleaning Activities, and Finishing

For each process or activity listed in the checklist, the inspector should verify the following for each process or activity (using the checklist questions):

- Description
- Types and amounts of materials used
- Types and amounts of wastes generated
- General condition.

The checklist contains notes for the inspector regarding compliance issues with respect to individual wastes.

For each type of waste generated by the process or activity, the inspector should inquire about general or specific pollution prevention techniques and innovative technology as presented in the checklist.

When examining the process or activity areas, the inspector should document any evidence of noncompliance that presents an imminent threat to human health or the environment (e.g., leaks or spills of hazardous materials). He/she should take immediate action to notify (1) the facility of the situation and (2) the appropriate program office for follow-up action.

The checklist is meant only as a guide for questions, and the inspector should ask any other questions to obtain additional information or clarify answers.

The inspector should note any transfer of wastes from one media to another resulting from process operations.

Waste Handling and Management

The waste handling and management section of the checklist is organized by type of waste being managed and includes wastewater, hazardous solid wastes, and air emissions. This part of the assessment will generally involve hazardous wastes storage containers, wastewater treatment equipment, and air pollution control equipment. However, silver recovery units, may be examined as part of image processing, depending on where the silver recovery unit(s) are located in the facility.

For the waste handling and management areas, the inspector should verify the following (using the appropriate checklist questions):

- Air and wastewater:
  - Any existing permits and permit requirements
  - Type of treatment process
  - Condition of treatment equipment
  - Any noncompliance.

- Hazardous solid wastes:
  - Any existing permit (if TSD facility)
  - Condition of storage containers and storage area
  - Length of storage
  - Waste transportation
  - Any noncompliance.

Evaluation of these areas will also involve *records review*. For example, if a facility has a wastewater permit, the inspector should review the permit for selected requirements (e.g., limited parameters and self-monitoring frequency) and then assess compliance with these requirements. All violations should be documented. The sections in the checklist that will likely require records review are appropriately marked.

The inspector should identify any media transfer of wastestreams resulting from pollution control/management practices (e.g., generation of sludges from wastewater treatment or generation of scrubber water from air pollution control equipment).

- **Closing Conference/Discussion**

  As part of the closing conference/discussion, the inspector should do the following:

  - Convey the results of the assessment to the facility including all obvious violations noted

- Clarify information obtained and ask any outstanding questions
- Discuss general potential pollution prevention and innovative technology opportunities
- Distribute general or printing-specific compliance assistance literature
- Distribute general or printing-specific pollution prevention or innovative technology literature
- Distribute list of selected references (Appendix C in this guidance)
- Provide contacts at appropriate agencies that give compliance or technical assistance (e.g., hotlines, technical assistance offices).

The inspector should communicate to the facility that all results are preliminary until follow-up review is completed.

Preparation of Assessment Report

After the assessment, the inspector should complete the assessment report form in Appendix B. This form contains sections for results of both compliance assessment and identification of pollution prevention and innovative technology opportunities:

- **Compliance assessment sections**—The inspector should note any actual and potential violations identified during the assessment.
- **Pollution prevention sections**—The inspector should at a minimum provide a list of opportunities identified based on the checklist questions. However, the checklist questions do not cover the full range of potential opportunities for printing processes. If the inspector has additional time and the appropriate references [such as those listed in the selected reference list (Appendix C1)], he/she can identify other potential opportunities that can be listed in the assessment report.

Follow-Up Activities

After the assessment, the inspector will be responsible for recommending what follow-up actions should be taken. At a minimum, the inspector should provide a report to the facility

(example report form shown in Appendix B) that contains a compliance assessment (with list of actual or potential violations) and list of pollution prevention opportunities (including innovative technology). Additional potential follow-up actions to be taken include the following:

- Referral to specific program office for comprehensive follow-up inspection
- Referral to technical assistance office for follow-up assistance
- Follow-up inspection to determine if facility implemented pollution prevention techniques.

After conferring with his/her supervisor, the inspector may take one or more of these actions depending on the particular findings of the assessment. In some States there are special programs targeted at printing facilities. For example, the Washington Department of Ecology has a program called Snapshots in which inspectors provide compliance assistance during visits to printing facilities and also provide the facility with a summary report containing actions that it should undertake. The State is planning follow-up inspections to determine if the facilities have completed these actions.

In some situations the inspector may decide that it is appropriate to refer the facility to a media-specific program office because violations that could potentially pose a significant risk to human health or the environment were found during the assessment. In any case, the appropriate follow-up actions should be determined in coordination with the inspector's supervisor and applicable enforcement policies.

APPENDIX A

MULTIMEDIA COMPLIANCE/POLLUTION PREVENTION ASSESSMENT CHECKLIST FOR LITHOGRAPHIC PRINTERS

I. GENERAL FACILITY INFORMATION

A. General Facility Operations

(1) When did the facility begin operations?

	Yes	No
(2) Have there been previous printing operations at this location?		

(3) What are the facility's hours of operation? _____

(4) What types of printing is done at the facility?

- ☐ Heatset
- ☐ Nonheatset Sheet
- ☐ Nonheatset Web

(5) Describe the printing system. Complete schematic on page A-2 by listing raw materials used and wastes generated for each process/activity. If possible, obtain a copy of a schematic or process diagram from the facility.

Complete Table 1 (pages A-3 and A-4) by listing wastes generated by process/activity, quantity generated, disposal method, and whether the waste is hazardous or nonhazardous.

I. GENERAL FACILITY INFORMATION (Continued)

A. General Facility Operations (Continued)

Schematic of Printing Operations (Example Diagram Included)

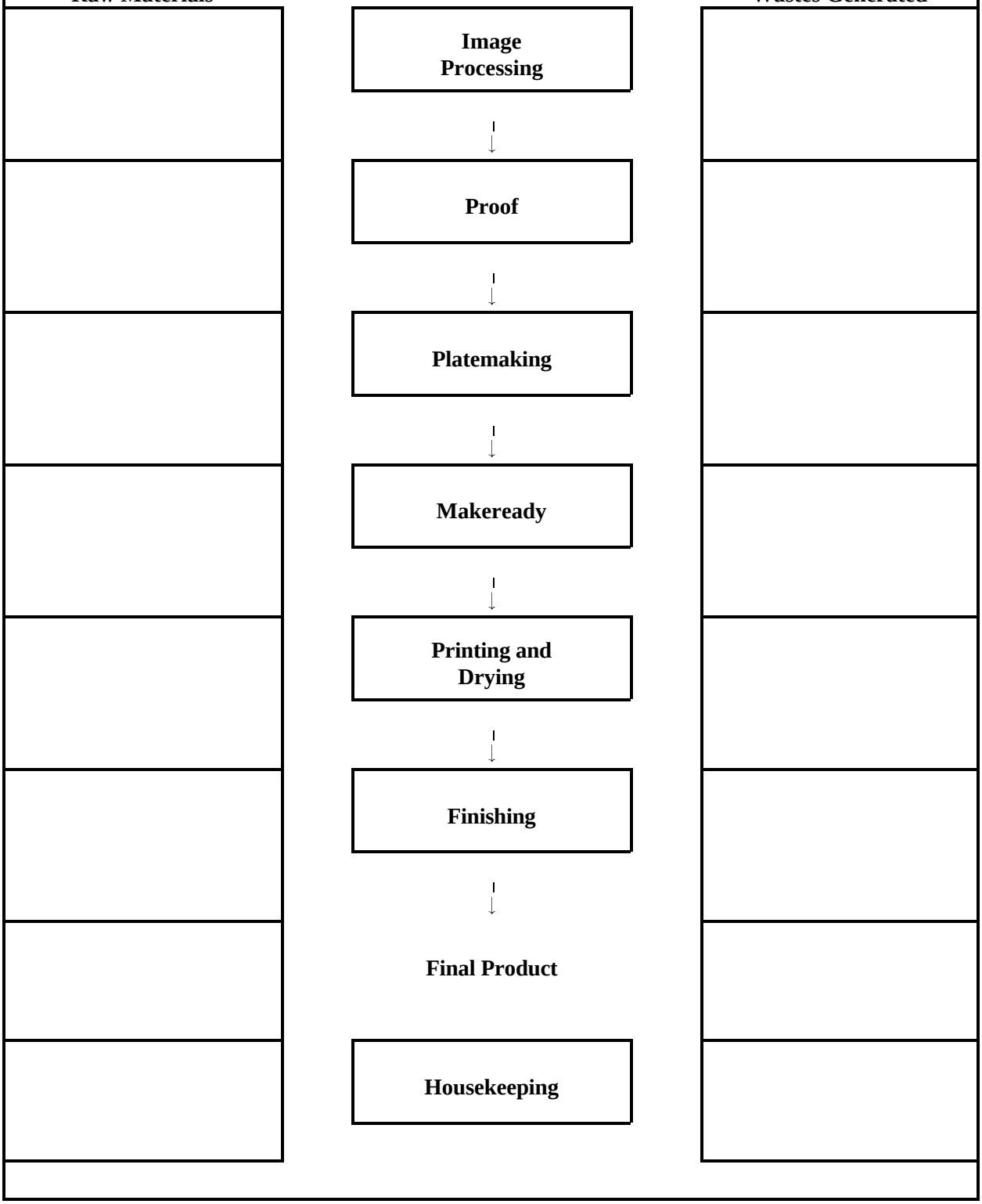


Table 1. Summary of Wastes Generated, Quantity, and Disposal Methods

Type of Wastes Generated (including EPA and State code if applicable)	Quantity Generated per Month	Disposal Method(s)	Hazardous or non-hazardous?
General Housekeeping/Materials Storage			
Image Processing			
Platemaking			

Table 1. Summary of Wastes Generated, Quantity, and Disposal Methods (Continued)

Type of Wastes Generated (including EPA and State code if applicable)	Quantity Generated per Month	Disposal Method(s)	Hazardous or non-hazardous?
Makeready/Printing			
Cleaning Activities			
Finishing			

Total Hazardous Waste Generated Per Month _____

Total Acute Hazardous Waste Generated Per Month _____

I. GENERAL FACILITY INFORMATION (Continued)

A. General Facility Operations (Continued)

		Yes	No
(7)	Has a pollution prevention or waste minimization plan been developed by the facility?		

If yes, under which program(s)?

		Yes	No
(8)	Has the facility evaluated which wastes are probable candidates for reductions through pollution prevention activities (i.e., has the facility identified or implemented any process chemical changes to reduce air emissions or hazardous waste generation)		

If yes, list the wastes and describe pollution prevention activities currently being undertaken.

(9) What type of training activities are conducted at the facility?

		Yes	No
(10)	Have employees been trained in the fundamentals of pollution prevention?		

B. Wastewater

(1) Does the facility discharge wastewater into:

Surface Water?	☐	Receiving Stream
		NPDES Permit No.
Municipal Sewer?	☐	Name of WWTP
		Permit No. (if applicable)
Subsurface System?	☐	Type

I. GENERAL FACILITY INFORMATION (Continued)

B. Wastewater (Continued)

(2) In the following table, indicate the volume of wastewater discharged by type and disposal method.

Wastewater Type	Surface Water	Municipal Sewer	Disposal Subsurface System	Other
Sanitary				
Process(es)				
Noncontact Cooling				
Storm Water				
Other				
Total				

Notes to Inspector:

If the facility does not know the volume of its sanitary waste discharge, it can be estimated by multiplying the number of employees by the residential equivalent units estimate of 25-35 gallons per day per worker.

Storm water discharges only apply to outdoor, exposed industrial areas. Industrial areas are defined as areas where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water.

C. Air

	Yes	No
(1) Is the facility located in an area designated as nonattainment for the National Ambient Air Quality Standard for Ozone?		

(2) Is the facility designated as a major source of:	Yes	No
• VOCs?		
• NOx?		
• Hazardous Air Pollutants (HAPs)?		

I. GENERAL FACILITY INFORMATION (Continued)

C. Air (Continued)

	Yes	No
(3) If yes, is the facility subject to applicable Reasonably Available Control Technology (RACT) requirements for lithographic printers?		

(4) Indicate types and estimated amounts of air emissions (e.g., VOCs) from various sources.

Type of Emissions (e.g., VOCs)	Source (e.g., Cleaning Tank)	Amount

Notes to Inspector:

The mass balance method can be used to estimate VOC emissions. An example of a mass balance to calculate VOC emissions is presented below:

Example: A printer's chemical usage for one year is ink (10,000 lbs, 15% VOC content), alcohol (1,000 gallons, density 6.0 lbs/gallon), and press wash (1,000 gallons, 50% VOC and specific gravity 0.7). 100 lbs of ink are disposed of in waste shipments.

First, determine how many pounds of each chemical is used.

ink = 10,000 lbs
alcohol = 1,000 gallons x 6 lbs/gallon = 6,000 lbs
press wash = 1,000 gallons x (0.7 x 8.34 lbs/gal) = 5,838 lbs

Next, determine the annual amount of VOCs used by multiplying the pounds used by the VOC fraction.

ink = 10,000 lbs x 0.15 = 1,500 lbs
alcohol = 6,000 lbs x 1.0 = 6,000 lbs
press wash = 5,838 lbs x 0.5 = 2,919 lbs

Emissions of VOCs can now be estimated by subtracting the disposed amount (or the amount remaining with the product) from the amount used.

discarded ink = 100 lbs x 0.15 = 15 lbs
1,500 lbs (from second step) - 15 lbs = 1,485 lbs

press wash disposed of in cleaning cloths = 500 lbs
2,919 (from second step) - (500 lbs x 0.5) = 2,669 lbs

Total VOC emissions are 1,485 lbs (ink) + 6,000 lbs (alcohol) + 2,669 lbs (press wash) = 10,154 lbs

I. GENERAL FACILITY INFORMATION (Continued)

C. Air (Continued)

	Yes	No
(5) Was equipment installed under New Source Review requirements?		

If yes, to which of the following is the equipment subject? Check the one that applies.

- ☐ Major source best available control technology (BACT) requirements under prevention of significant deterioration (PSD)
- ☐ Lowest achievable emission rate (LAER) requirements for nonattainment areas
- ☐ Minor source State or local new source review (NSR) requirements

	Yes	No
(6) Does the facility have a permit?		

Permit ID _____

If yes, does the permit cover any of the following activities? Check any that apply.

- ☐ Construction/operation of presses, control devices, distillation units and proofing and/or binding equipment
- ☐ Operation of existing presses, control devices, distillation units and/or proofing and binding equipment
- ☐ Modification of existing equipment or changing materials (e.g., inks, fountain solutions, cleaning solvents, etc.)

D. Emergency Planning and Community Right-To-Know

	Yes	No
(1) Does the facility have on-site any of the Extremely Hazardous Substances (EHS) in excess of the established threshold planning quantities?		

If yes, list substances.

	N/A	Yes	No
(2) If hazardous chemicals are present in excess of 10,000 lbs., have the material safety data sheets (MSDS) (or a list of chemicals) and chemical inventory forms been submitted to State and local emergency planning authorities and fire departments?			

I. GENERAL FACILITY INFORMATION (Continued)

D. Emergency Planning and Community Right-To-Know (Continued)

		N/A	Yes	No
(3)	Was the State Emergency Response Commission (SERC) and Local Emergency Planning Committee (LEPC) notified of the presence of hazardous chemicals for local planning purposes?			

		Yes	No
(4)	Has the facility released an extremely hazardous substance (EHS) or a CERCLA hazardous substance in excess of the Superfund reportable quantity?		

- If yes, was notification of the release provided?
- To whom? _____
- Was notification oral or written? _____

	Yes	No
• Was oral notification followed up by written notification?		

		Yes	No
(5)	Does the facility have Material Safety Data Sheets (MSDS) readily available for all hazardous chemicals used? (OSHA requirement)		

E. EPCRA Section 313 – Toxic Release Inventory

		Yes	No
(1)	Does the facility have ten or more full-time employees?		

		Yes	No
(2)	Did the facility use more than 10,000 lbs. of at least one toxic chemical during a previous calendar year?		

		N/A	Yes	No
	If yes, did the facility file a Section 313 Toxic Chemical Release Inventory Form R for the chemical(s)?			

F. Hazardous Wastes

		Yes	No
(1)	Does the facility generate hazardous wastes from printing activities?		

I. GENERAL FACILITY INFORMATION (Continued)

F. Hazardous Wastes (Continued)

	Yes	No
(2) Does the facility have an EPA ID No.?		

EPA ID No.: _____

	Yes	No
(3) Is the facility's waste determination method (i.e., to determine whether a waste is hazardous or nonhazardous) adequate?		

	Yes	No
(a) Does the facility determine if its waste is excluded from regulation under Part 261.4(b) (i.e., solid wastes which are not hazardous wastes, such as household waste)?		

	Yes	No
(b) If no, does the facility determine if the waste is listed in Part 261, Subpart D (examples of listed wastes typically found in the printing industry include tetrachloroethylene, methylene chloride, xylene, and acetone)?		

	Yes	No
If yes, does the facility determine if the waste has been excluded from the lists in Subpart D or Part 261.3 in accordance with 260.20 or 260.22 (which allows petitions to amend Part 261 to exclude a waste produced at a particular facility)?		

	Yes	No
If no, does the facility determine if the waste exhibits any of the characteristics specified in Part 261, Subpart C (for example, characteristics of ignitability, corrosivity, reactivity, and EP toxicity)?		

(4) Is the facility a

- ☐ Large quantity generator?
- ☐ Small quantity generator?
- ☐ Conditionally exempt small quantity (CESQG) generator?

I. GENERAL FACILITY INFORMATION (Continued)

F. Hazardous Wastes (Continued)

Notes to Inspector:

Check amounts in Table 1 to determine appropriate classification for facility.

Large quantity generator (LQG) generates 1000 kgs (2200 lbs) of hazardous waste (HW) or more per month. The waste must be shipped in 90 days and there is no limit to the amount that may be accumulated.

Small quantity generator (SQG) generates between 100kg (220 lbs) and 1000kg (2200 lbs) nonacute HW in a calendar month. The waste must be shipped in 180 days and is limited to accumulating no more than 6000kg (13200 lbs) HW on-site.

A conditionally exempt small quantity generator (CESQG) generates no more than 100kg (220 lbs) HW in a calendar month and accumulates less than 1000kg (2200 lbs) on-site; OR, generates less than 1kg (2.2 lbs) acute HW in a calendar month and accumulates less than 100kg (220 lbs) acute HW.

	N/A	Yes	No
(5) Excluding CESQGs, are the hazardous wastes at the facility consistent with generator notification records (i.e., are wastes generated for which the facility has not notified State or EPA?)			

(6) What are the hazardous wastes management practices? Check all that apply.

On-site:
- ☐ Satellite Accumulation
- ☐ Container storage
- ☐ Tank storage
- ☐ Treatment
- ☐ Disposal
- ☐ Other

I. GENERAL FACILITY INFORMATION (Continued)

F. Hazardous Wastes (Continued)

	Yes	No
(7) Does the facility generate wastes that are restricted from land disposal (i.e., liquid hazardous wastes having a pH ≤ 2.0; liquid hazardous wastes containing halogenated organic compounds at ≥ 1,000 mg/L)?		

	Yes	No
If yes, does the facility comply with Part 268 for land disposal restricted wastes?		

G. Toxic Substances Control

	Yes	No
(1) Does the facility import any chemical substances (e.g., ink)?		

	N/A	Yes	No
If yes, has the facility completed the appropriate certification statement?			

II. PROCESS EVALUATION

A. General Housekeeping/Materials Storage

Note to Inspector:

Check Table 1 (i.e., Summary of Wastes Generated, Quantity, and Disposal methods) to verify wastes generated as you complete this section of the checklist.

(1) Note any potential or actual problems regarding housekeeping and storage (e.g., air emissions, hazardous and nonhazardous solid wastes, and wastewater).

	Yes	No
(2) Is the shop clean and orderly to prevent accidents and spills?		

	Yes	No
(3) Does the facility use spigots and pumps when dispensing raw materials?		

II. PROCESS EVALUATION (Continued)

A. General Housekeeping/Materials Storage (Continued)

		Yes	No
(4)	Does the facility use funnels for transferring wastes to storage containers?		

		Yes	No
(5)	Does the facility implement dry methods for cleanup whenever possible?		

		Yes	No
(6)	Does the facility have a spill prevention plan?		

Note to Inspector:

Some POTWs may require printing facilities to develop spill prevention (or slug control) plans that include the following:

- *Description of discharge practices, including non-routine batch discharges*
- *Description of stored chemicals*
- *Procedures for immediately notifying the POTW of slug discharges*
- *Procedures to prevent adverse impacts from spills*

		Yes	No
(7)	Does the facility have any floor drains leading directly to the sewer where the solvent or ink is stored?		

		N/A	Yes	No
	If yes, in the event of a spill, will contaminants enter the floor drains?			

If yes, what is the characteristic of wastewater contained in the floor drains and where do the floor drains discharge?

		Yes	No
(8)	Does the facility use a "first-in first-out" policy to avoid the expiration of raw materials?		

		Yes	No
(9)	Are **infrequently** used materials ordered in small containers?		

II. PROCESS EVALUATION (Continued)

A. General Housekeeping/Materials Storage (Continued)

		Yes	No
(10)	Are **frequently** used materials ordered in large containers?		

		Yes	No
(11)	Can the facility store products in locations that will preserve their shelf life?		

		N/A	Yes	No
(12)	If materials have exceeded their shelf life, are alternative uses considered before discarding?			

		N/A	Yes	No
(13)	Does the facility purchase materials from manufacturers that will accept returned materials if shelf life is exceeded?			

B. Image Processing

a. General

		Yes	No
(1)	Is image processing done at the facility?		

Note to Inspector:

Check Table 1 (i.e., Summary of Wastes Generated, Quantity, and Disposal Methods) to verify wastes generated as you complete this section of the checklist.

Typical wastes from image processing include the following: used film, process solutions containing photographic chemicals (fixer and developer) and silver (dissolved from processing film).

Typical hazardous wastes generated from image processing include: developers and fixers. Most developers contain levels of hydroquinone. If disposed of as an unused product it may be defined as a hazardous waste in applicable State regulations due to the concentration of hydroquinone. If the hydroquinone is consumed during use and does not show up in used developer, it is not considered hazardous. Fixers which allow silver to dissolve out of the film and paper can contain up to 4,000 ppm silver. Any solutions containing silver at concentrations greater than 5 ppm are considered hazardous wastes.

In addition, some POTWs may have limits for silver in industrial discharges that are below 5 ppm. The facility should be aware of the applicable silver limits for its discharge.

II. PROCESS EVALUATION (Continued)

B. Image Processing (Continued)

(2) Note any potential or actual problems regarding image processing with respect to air emissions, nonhazardous and hazardous solid wastes, and wastewater.

b. Process Solutions

(1) List the chemicals/solutions and amounts used for:

	Type	Amount
Developer		
Fixer		
Stop Bath		

(2) How are bath solutions currently monitored?

	Yes	No
(3) Are bath solutions changed on a set schedule?		

If yes, what is the schedule? _____

(4) With respect to the process bath, does the facility do any of the following:

	Yes	No
• Add ammonium thiosulfate to silver-contaminated baths to extend the allowable build-up of silver?		
• Prolong the potency of oxidation process baths by reducing their exposure to air?		
• Routinely monitor pH?		

II. PROCESS EVALUATION (Continued)

B. Image Processing (Continued)

	Yes	No
(5) Does the facility use squeegees following all processing solutions and washes in automatic processing machines?		

Note to Inspector:

Squeegees can significantly reduce the amount of solution carried out of the bath on the film. This reduces bath changeouts and replenishment rates. Types of squeegees include wiper blades, air squeegees, vacuum squeegees, wringersling squeegees, and rotary-buffer squeegees.

	Yes	No
(6) Does the facility use water recirculation units to reduce water use and wastewater generation?		

	N/A	Yes	No
(7) If the facility uses multiple rinses, is counter current rinsing used?			

Note to Inspector:

If no, water recirculation units can reuse photoprocessing bath waters but filters from water recirculation units require disposal and may be considered hazardous wastes.

	Yes	No
(8) Is an automatic film processor used?		

	N/A	Yes	No
If yes, is a continuous rinse used?			

How often are the processor's chemical tanks cleaned out? _____

c. Silver Recovery

(1) Does the facility use any of the following on-site silver recovery techniques to reduce silver concentrations in the discharge? (Check any that apply.)

- ☐ Electrolytic silver recovery
- ☐ Automatic recirculating silver recovery
- ☐ Metallic replacement canisters
- ☐ Ion exchange units
- ☐ Other (specify)

II. PROCESS EVALUATION (Continued)

B. Image Processing (Continued)

	Yes	No
(2) Does the facility ship wastes for off-site silver recovery?		

Notes to Inspector:

Several on-site and off-site silver recovery methods are available.

- *On-site units include the following: electrolytic silver recovery (ESR) and metallic replacement units. Silver removed from the ESR and the metallic cartridges and fixer solutions are hazardous wastes and must be handled properly.*
- *Off-site silver recovery includes sending fixer bath solutions to a fixer recycler to recover silver and possibly regenerate the fixer or processing off-site cartridges from an on-site metallic replacement canister.*

d. Used Film

	Yes	No
(1) Has the facility explored the use of silverless films?		

If yes, which type? (Check any that apply.)

- ☐ Diazo
- ☐ Photopolymer
- ☐ Electrostatic

	N/A	Yes	No
Has the use of these films reduced the amount of silver contaminated fixing or wash solutions?			

	Yes	No
(2) Does the facility recycle photographic film?		

e. Innovative Technology (Web Printing)

	Yes	No
(1) Has the facility considered installing waterless paper and film developing units to reduce the volume of fixer waste?		

II. PROCESS EVALUATION (Continued)

B. Image Processing (Continued)

	Yes	No
(2) Does the facility use electronic imaging?		

C. Platemaking

a. General

	Yes	No
(1) Is platemaking done at the facility?		

Notes to Inspector:

Check Table 1 (i.e., Summary of Wastes Generated, Quantity, and Disposal Methods) to verify wastes generated as you complete this section of the checklist.

Typical wastes from platemaking include the following: used plates, developed film, acids, alkalis, solvent, plate coatings, plate developers, and wastewater.

Typical hazardous wastes generated from the platemaking process may include: plate developers and activators.

(2) Note any potential or actual problems regarding platemaking with respect to air emissions, hazardous and nonhazardous solid wastes, and wastewater.

II. PROCESS EVALUATION (Continued)

C. Platemaking (Continued)

(3) What type of plates are used?

- ☐ Presensitized
- ☐ Laser Imaged
- ☐ Electrostatic
- ☐ Diffusion Transfer
- ☐ Photo Direct
- ☐ Direct Image

(4) How many plates are developed? _____

(5) What material(s) are the plates made from?

(6) Are plates recycled?

Yes	No

(7) Does the facility use two-sided plates to reduce the number of plates used?

Yes	No

b. Waste Solutions

(1) Is the platemaker a self-contained system?

Yes	No

(2) What are the types and quantities of coatings and developers used?

Type	Quantity

II. PROCESS EVALUATION (Continued)

C. Platemaking (Continued)

		Yes	No
(3)	Is the developer washed off the plates to the sewer?		

If no, what is done with the developer?

c. Innovative Technology

		Yes	No
(1)	Has the facility considered laser imaged platemaking?		

If yes, note the status of its use (e.g., currently using for approximately 50% of business) and any impediments to its use.

D. Printing

a. General

Notes to Inspector:

Check Table 1 (i.e., Summary of Wastes Generated, Quantity, and Disposal Methods) to verify wastes generated as you complete this section of the checklist.

Typical wastes from printing processes include the following: paper, volatile organic compounds, waste ink, empty ink containers, and used plates.

Typical hazardous wastes generated from the printing process include: ink/ink skins and fountain solutions. Used printing inks can contain materials that would be considered hazardous wastes. For some chemicals the wastes are hazardous at any concentration while for other chemicals, the wastes are hazardous if they exceed specific regulatory limits.

Some agencies have requirements on the maximum VOC content for printing inks.

Fountain solutions are made up of water and chemical additives. The most common additive is IPA and is a volatile organic compound. To avoid VOCs, alternative chemicals may be used. Certain alternatives, such as ethylene glycol (>10%) could be a hazardous waste (under State regulations) if spent solutions are disposed.

II. PROCESS EVALUATION (Continued)

D. Printing (Continued)

(1) Note any potential or actual problems regarding printing with respect to air emissions, hazardous and nonhazardous solid wastes, and wastewater.

b. Waste Ink and Empty Ink Containers

	Yes	No
(1) Do any of the inks contain hazardous materials such as solvents or heavy metals (i.e., fluorescent/bright-colored inks frequently contain higher concentrations of heavy metals)?		

List the hazardous constituents.

(2) Does the facility use any of the following less hazardous inks? (Check any that apply.)

- ☐ Vegetable/soy inks
- ☐ Ultraviolet curable inks
- ☐ Electron beam curable inks
- ☐ Water washable ink system
- ☐ Waterless inks

II. PROCESS EVALUATION (Continued)

D. Printing (Continued)

(3) Does the facility do any of the following? (Check any that apply.)

- ☐ Fill ink fountains according to need as opposed to routine filling?
- ☐ Use automatic ink levelers?
- ☐ Clean ink fountains between runs?
- ☐ Properly reseal ink containers (or cover with a lid or wax paper) after use to reduce skinning and to maintain ink quality?

	Yes	No
• Use any other measures to prevent drying ink or formation of skins inside the fountain?		

If yes, describe the measures:

	Yes	No
• Use anti-skinning aerosols to prevent ink dry-up during shutdowns?		

If yes, list type of aerosol used:

Note to Inspector:

II. PROCESS EVALUATION (Continued)

D. Printing (Continued)

(4) Does the facility use any of the following measures to reduce cleaning? (Check any that apply.)

- ☐ Use a standard ink sequence
- ☐ Run similar jobs on the same day or schedule jobs using light colored inks before darker ones
- ☐ Dedicate one press for inks containing hazardous pigments or solvents

	Yes	No
(5) Does the facility do any of the following with unused portions of ink? (Check any that apply.)		

- ☐ Save for house colors
- ☐ Offer customer discounts on leftover inks
- ☐ Use on donated jobs

If no, what do they do with the unused inks?

(6) Does the facility do any of the following with waste inks? (Check any that apply.)

- ☐ Reuse
- ☐ Recycle
- ☐ Return to the manufacturer

	Yes	No
(7) Does the facility purchase ink in bulk containers that may be returned to the supplier for refilling?		

II. PROCESS EVALUATION (Continued)

D. Printing (Continued)

c. Fountain Solutions

(1) What type of VOC fountain solution is used?

Yes	No

(2) Does the facility use compliant (low-VOC) fountain solutions to meet regulatory requirements?

Notes to Inspector:

Most regulations offer the option of low-VOC fountain solutions or air pollution control devices. The EPA recommended levels of control for reasonably available control technology (RACT) are as follows:

- *Heatset web: No greater than 1.6 percent alcohol by volume or no greater than 3.0 percent alcohol by volume if the solution is refrigerated to less than 60 °F. Higher levels of control are possible using alcohol substitutes or less alcohol in the fountain solution.*
- *Sheetfed: No greater than 5.0 percent alcohol by volume or no greater than 8.0 percent alcohol by volume if the solution is refrigerated. Higher levels of control are possible using alcohol substitutes or less alcohol.*
- *Nonheatset web: Nonalcohol additives or alcohol substitutes can be used to make the final solution less than 3.0 percent additive by volume.*

Yes	No

(3) Have alternative fountain solutions been tried?

N/A	Yes	No

(4) Has the facility considered refrigerating fountain solutions to maximize the efficiency of isopropyl alcohol (IPA) and non-IPA solutions?

Yes	No

(5) Does the facility fill ink fountains based on the run or shift?

Yes	No

(6) Does the facility use permanent total enclosures (PTEs) to caputure press emissions?

II. PROCESS EVALUATION (Continued)

D. Printing (Continued)

d. Paper Wastes

		Yes	No
(1)	Is paper use minimized by proper pre-production planning and lay-out?		

		Yes	No
(2)	Does the facility utilize improved start-up procedures to reduce paper waste to a minimum?		

		Yes	No
(3)	Is waste paper and trash sent to a recycler?		

		Yes	No
(4)	Does the facility view jobs on a personal computer before printing?		

(5) What are the most common causes of off-specification printing?

		Yes	No
(6)	Does the facility monitor press performance continuously to minimize bad runs and waste?		

		Yes	No
(7)	Has the facility evaluated press performance by integrating the amount of waste generated per process?		

e. Other

		Yes	No
(1)	Does the facility generate any waste oils from the presses?		

		N/A	Yes	No
	If yes, is waste lube-oil sent to a recycler?			

		N/A	Yes	No
(2)	Are used oil storage tanks and containers in good condition?			

II. PROCESS EVALUATION (Continued)

D. Printing (Continued)

		N/A	Yes	No
(3)	Are the storage tanks labeled "used oil?"			

		Yes	No
(4)	Are there any used-oil spills or leaks to the environment?		

f. Innovative Technology (Web Printing)

		N/A	Yes	No
(1)	Is an automatic web splicer used to save time and reduce paper waste?			

		N/A	Yes	No
(2)	Do the presses employ web break detectors to prevent damage to the press?			

E. Cleaning Activities

a. General

(1) What type of cleaning activities does the facility perform and how often are they performed?

Notes to Inspector:

Check Table 1 (i.e., Summary of Wastes Generated, Quantity, and Disposal Methods) to verify wastes generated as you complete this section of the checklist.

Typical wastes from cleaning activities include: waste cleaner with residual ink, waste ink from the ink fountain, rags or shop towels containing cleaner and ink, empty solvent containers, and VOC emissions from cleaners.

Typical hazardous wastes generated from cleaning activities may include: parts washer solvents, shop towels, press washes, and ink cleanup sludges. Parts washer solvents typically become hazardous when they can't be used any longer. Shop towels may be considered a hazardous waste depending on the materials they are in contact with (e.g., inks, solvents) and how they are handled (e.g., thrown away). Press washes have a high VOC content and may contain F listed RCRA chemicals that would make them hazardous when disposed. Ink cleanup sludges are generated from press cleaning operations and are considered hazardous when they are mixed.

Tear-down and repair of equipment can produce large quantities of cleaning waste as compared to waste produced during normal operation.

II. PROCESS EVALUATION (Continued)

E. Cleaning Activities (Continued)

(2) Note any potential or actual problems regarding cleaning activities with respect to air emissions, nonhazardous and hazardous solid wastes, and wastewater.

b. Spent Cleaner

(1) List the type of solvents or other solutions used as cleaners.

Yes	No

(2) Has the use of less hazardous cleaning solvents been attempted (e.g., soaps and detergents) for cleaning?

If yes, list type of solvent.

> ***Note to Inspector:***
>
> *Citric-acid and aqueous-based cleaners may replace petroleum-based solvents and those containing aromatic compounds.*

Yes	No

(3) Has the facility worked with its vendor to find the lowest VOC press wash that still works effectively?

Yes	No

(4) Does the facility have a solvent management plan to reduce solvent waste at the facility?

II. PROCESS EVALUATION (Continued)

E. Cleaning Activities (Continued)

	Yes	No
(5) Does the facility have solvent containers or tanks?		

	Yes	No
If yes, are solvent container lids tight fitting and in place when not in use?		

	N/A	Yes	No
(6) Are solvent tanks equipped with emission control equipment?			

If yes, specify the type of equipment.

	Yes	No
(7) Has the facility considered using automatic cleaning equipment (e.g., an automatic blanket cleaner)?		

	Yes	No
(8) Is the roller blade kept in good condition and its angle checked for most effective cleaning?		

	Yes	No
(9) Does the facility segregate spent solvents according to color or ink?		

(10) How are waste solvents handled? (Check any that apply.)

- ☐ Discharged to drains
- ☐ Captured as liquid
- ☐ Associated with rags, shop towels, or other absorbent materials

	Yes	No
(11) Does the facility reuse or recycle solvents?		

If yes, how is it reused or recycled?

II. PROCESS EVALUATION (Continued)

E. Cleaning Activities (Continued)

(12) If solvents are recycled on-site:

	N/A	Yes	No
Does the solvent recycling process generate cooling water?			

What procedures are used to ensure cooling water is not contaminated from equipment leaks?

c. Shop Towels

(1) How are rags handled? (Check one that applies.)

☐ Washed on premises

☐ Picked up by commercial laundry: _____

(name of laundry)

	Yes	No
(2) Does the facility use press wipes as long as possible before discarding or laundering?		

	Yes	No
(3) Does the facility implement procedures to remove excess solvents or inks in the rags so they can be cleaned by an industrial laundry?		

Note to Inspector:

A variety of approaches can be used to minimize the amount of solvents or inks in rags. These include:

- *Changing clean up procedures so that solvent levels are kept to a minimum in the rags*
  - *Use practices that limit the worker's ability to soak rags in solvent (plunger cans, squeeze bottles, daily solvent allocations, directly pour solvent waste into labeled drums, etc...)*
- *Developing a procedure to separate a majority of the ink and solvent from soaked rags*
  - *Centrifugal extractor or wringer*
- *Using parts washing equipment as an alternative to rags for cleaning trays that collect solvents and inks below each roller of the press.*

II. PROCESS EVALUATION (Continued)

F. Finishing

(1) What type of finishing operations are done at the facility?

> ***Note to Inspector:***
>
> *Check Table 1 (i.e., Summary of Wastes Generated, Quantity, and Disposal Methods) to verify wastes generated as you complete this section of the checklist.*

(2) Note any potential or actual problems regarding finishing operations with respect to air emissions, nonhazardous and hazardous solid wastes, and wastewater.

> ***Note to Inspector:***
>
> *Typical wastes from the finishing process include the following: waste paper trimmings, VOCs, and waste glue.*

Yes	No

(3) Does the facility incorporate pollution prevention techniques or use innovative technology to reduce finishing wastes?

If yes, describe the techniques or technology.

III. WASTE HANDLING AND MANAGEMENT

A. Wastewater Management

(1) List the expected pollutants in the facility's wastewater discharge.

Yes	No

(2) Does the POTW have sewer use limits for any of these pollutants?

If yes, list the pollutants.

N/A	Yes	No

(3) Does the facility have a current wastewater discharge permit?

N/A	Yes	No

If no, has the facility applied for a permit?

(4) If the facility has a wastewater discharge permit, complete the following:

List the parameters limited in the facility's permit.

Parameter	Limit

Is the facility in compliance with the following requirements in its permit?

	N/A	Yes	No
Permit limits			
Sampling location			
Sampling frequency			
Parameters analyzed			
Analytical methods			
Reporting			
Recordkeeping			

III. WASTE HANDLING AND MANAGEMENT (Continued)

A. Wastewater Management (Continued)

If no is checked for any of the above items, describe the potential or actual noncompliance with specific permit requirements.

(5) Describe any observable impact of the wastewater discharge. (For example, is the discharge clear and free of solids or are there any unusual odors?)

(6) Describe any wastewater treatment employed at the facility. (Note: This does not include any recovery systems.)

	Yes	No
(7) Is wastewater treatment sludge generated on-site?		

If yes, how is it disposed?

If applicable, where does the water, removed from the sludge dewatering process, return to the facility?

	Yes	No
(8) For facilities that discharge to POTWs, did the facility notify the POTW if any substances discharged by the facility would be a hazardous waste under 40 CFR Part 261?		

B. Hazardous Solid Wastes Management

	Yes	No
(1) Is hazardous waste accumulated in containers at or near the point of generation (i.e., in the process areas)?		

	N/A	Yes	No
If yes, is the capacity of the containers less than 55 gallons or is the quantity of wastes accumulated less than 55 gallons?			

III. WASTE HANDLING AND MANAGEMENT (Continued)

B. Hazardous Solid Wastes Management (Continued)

	Yes	No
Is excess accumulation removed within 3 days?		

	Yes	No
(2) Does the facility have a hazardous waste storage area?		

	Yes	No
(3) Are the waste storage containers indoors or in covered areas to prevent moisture from seeping in?		

(4) Are the hazardous wastes containers managed as follows? (Check all that apply.)

- ☐ Containers in good condition (no rusting, defects or evidence of leaks)
- ☐ Containers properly labeled as "Hazardous Waste" and start date of accumulation
- ☐ Containers compatible with waste
- ☐ Containers closed when not in use
- ☐ Containers opened, handled, and stored in a manner not to cause a leak
- ☐ Containers storing incompatibles kept separate
- ☐ Containers appropriately stored for:
  - ☐ 90 days or less
  - ☐ 180 days or less
  - ☐ 270 days or less

For items not marked, please describe the problem.

	Yes	No
(5) Is there adequate secondary containment capacity for free liquid wastes stored in a storage area?		

III. WASTE HANDLING AND MANAGEMENT (Continued)

B. Hazardous Solid Wastes Management (Continued)

	Yes	No
(6) Are any hazardous wastes shipped off-site?		

	Yes	No
If yes, does the facility use a manifest system?		

(7) Do the manifest records contain the following? Check all that apply.

- ☐ Generator EPA ID number
- ☐ Generator name, address, phone number
- ☐ Transporter name, EPA ID number
- ☐ Designate facility name, address, phone number, and EPA ID number
- ☐ Alternate facility identified
- ☐ Five digit document number
- ☐ DOT shipping name, hazard class, waste code, and RQ
- ☐ Containers: number, type, quantity, unit wt/vol
- ☐ Proper certification, including waste minimization
- ☐ Dates and signatures

	Yes	No
(8) Have exception reports been required?		

	N/A	Yes	No
If yes, have they been submitted?			

	N/A	Yes	No
(9) Are manifest records maintained for 3 years?			

III. WASTE HANDLING AND MANAGEMENT

B. Hazardous Solid Wastes Management (Continued)

	N/A	Yes	No
(10) If wastes are reclaimed, does facility have a copy of the contractual agreement with reclaimer?			

	N/A	Yes	No
(11) Has the facility determined and submitted notifications of hazardous waste restricted from land disposal?			

If yes, do the notifications contain the following? (Check all that apply.)

- ☐ EPA hazardous waste number (e.g., F002)
- ☐ The corresponding treatment standard(s) (see 40 CFR 268.7(a)(l)(ii) for details)
- ☐ The manifest number associated with the shipment of waste
- ☐ Waste analysis data, where available

	N/A	Yes	No
(12) If land disposal restricted wastes are treated on-site, does facility have records documenting that wastes meet land disposal restriction treatment standards?			

C. Air Emissions Management

	Yes	No
(1) Does the facility have any of the air pollution control technologies?		

If yes, check any that apply.

- ☐ Incinerator
- ☐ Carbon Absorption Unit
- ☐ Condenser
- ☐ Ventilation Capture System

III. WASTE HANDLING AND MANAGEMENT

C. Air Emissions Management (Continued)

Note to Inspector:

Air pollution control technologies include the following:

- *Incinerators (including catalytic) – Incineration of exhaust gas is widely used in the printing industry. Often, heat is recycled back into the building (i.e., heat-set offset) or process dryers. Compliance is monitored by incineration temperature or change in temperature across the catalytic surface.*
- *Carbon Absorption – Carbon beds capture exhaust VOCs that are purged with steam. On-site distillation can be used to recover the solvent. Presses/facilities utilizing a single solvent can efficiently recover solvent for on-site use. This method is typically used on larger presses with hydrocarbon monitors to confirm efficiency.*
- *Condensers – Refrigerated coils are used to cool exhaust gas and cause solvent to condense for recovery. Condensers are not widely used in the graphics arts industry.*
- *Ventilation/capture Systems – VOCs are emitted primarily from fountain solutions, rollers and dryers on presses. Depending upon the design, these may or may not be enclosed parts of the press. The control efficiencies discussed below generally are based upon capture and control. Capture efficiency describes the ability of the system to pick-up VOC emissions and transfer them to the control device.*

(2) Does the facility have an air permit?

Yes	No

If no, has the facility applied for a permit?

Yes	No

(3) If the facility has an air permit, is it in compliance with the following requirements in its permit?

	N/A	Yes	No
Emissions limits			
Emissions monitoring			
Analytical methods			
Reporting			
Recordkeeping			

Other (describe): _____

(4) If no is checked for any of the above items, describe any actual or potential violations with specific permit requirements.

Acronyms

BACT	best available control technology
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	conditionally exempt small quantity generator
EHS	extremely hazardous substance
EPCRA	Emergency Planning and Community Right-to-Know Act
ESR	electrolytic silver recovery
HAB	hazardous air pollutant
IPA	isopropyl alcohol
LAER	lowest achievable emission rate
LEPC	Local Emergency Planning Committee
LQG	large quantity generator
MSDS	material safety data sheet
NPDES	National Pollutant Discharge Elimination System
NSR	new source review
P2	pollution prevention
POTW	publicly owned treatment works
PSD	prevention of significant deterioration
PTE	permanent total enclosure
RACT	reasonably available control technology
RCRA	Resource Conservation and Recovery Act
SERC	State Emergency Response Commission
SQG	small quantity generator
VOC	volatile organic compound
WWTS	wastewater treatment plant

MULTIMEDIA COMPLIANCE/POLLUTION PREVENTION ASSESSMENT CHECKLIST FOR LITHOGRAPHIC PRINTERS

Date and Time of Assessment: _____

Facility Name And Address _____

_____

_____

_____

_____

Facility Contact _____

(Name, title, and phone) _____

_____

Inspector(s):

Name	Title/Affiliation	Phone Number

TABLE OF CONTENTS

ACRONYMS

BACT	best available control technology
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	conditionally exempt small quantity generator
EHS	extremely hazardous substance
EPCRA	Emergency Planning and Community Right-to-Know Act
ESR	electrolytic silver recovery
HAP	hazardous air pollutant
IPA	isopropyl alcohol
LAER	lowest achievable emission rate
LEPC	Local Emergency Planning Committee
LQG	large quantity generator
MSDS	material safety data sheet
NPDES	National Pollutant Discharge Elimination System
NSR	new source review
P2	pollution prevention
POTW	publicly owned treatment works
PSD	prevention of significant deterioration
PTE	permanent total enclosure
RACT	reasonably available control technology
RCRA	Resource Conservation and Recovery Act
SERC	State Emergency Response Commission
SQG	small quantity generator
VOC	volatile organic compound
WWTP	wastewater treatment plant

GLOSSARY

Best Available Control Technology (BACT)

Technology required pursuant to Part 165 on new major sources and major modifications subject to prevention of significant deterioration (PSD) requirements, which reflect best controls in use taking into account costs and other non-air quality factors.

Lowest Achievable Emission Rate (LAER)

Degree of control required pursuant to Part 173 on new major sources and major modifications in nonattainment areas; technology must be best in use or most stringent in any State Implementation Plan.

Major Source

Stationary source in an ozone transport region that emits or has the potential to emit at least 50 tons per year of volatile organic compounds (VOCs).

New Source Review (NSR)

Program for pre-construction review of new major sources and major modifications under prevention of significant deterioration (PSD) and nonattainment requirements.

Nonattainment

Program established pursuant to Part D of Title I requiring controls necessary to attain National Ambient Air Quality Standards (NAAQSs) in areas currently not meeting them.

Prevention of Significant Deterioration (PSD)

Program established under Part C of Title I to preserve air quality in areas already meeting National Ambient Air Quality Standards (NAAQSs).

Reasonably Available Control Technology (RACT)

Technology required pursuant to Part 172 to be installed on existing major sources in nonattainment areas; reflects controls EPA has identified in control technique guidelines (CTGs) or other guidance.

Acknowledgements

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All Night Printery of Federal Way, Washington
Litho Craft, Inc. of Seattle, Washington
Seattle Times of Seattle, Washington and
Trojan Lithographic Corporation of Kent, Washington.

Their participation was extremely useful in preparation of the final guidance.

APPENDIX B

MULTIMEDIA COMPLIANCE/POLLUTION PREVENTION ASSESSMENT REPORT FORM FOR PRINTING FACILITIES

FACILITY NAME AND LOCATION: _____

MAILING ADDRESS: (if different) _____

FACILITY CONTACT(S):

Name	Title/Affiliation	Phone Number

ASSESSMENT DATE: _____

INSPECTOR(S):

Name	Title/Affiliation	Phone Number

REASON FOR VISIT: _____

AREAS VISITED: _____

DATE FORM COMPLETED: _____

I. GENERAL FACILITY DESCRIPTION

Provide a general description of the facility (e.g., building age, length of business at this location, previous owners/operators at the site, printing capacity, brief description of processes, brief overview of wastes generated and disposal methods used, and status of P2 implementation efforts).

II. COMPLIANCE ASSESSMENT

Wastewater

Describe any observed or potential violations:

Referral to other program office _____

Air Quality

Describe any observed or potential violations:

Referral to other program office _____

Emergency Planning and Community Right-to-Know Act (EPCRA)

Describe any observed or potential violations:

Referral to other program office _____

Hazardous Waste [Resource Conservation and Recovery Act (RCRA)]

Describe any observed or potential violations:

Referral to other program office _____

Toxic Substances Control

Describe any observed or potential violations:

Referral to other program office _____

III. POLLUTION PREVENTION (P2) AND INNOVATIVE TECHNOLOGY OPPORTUNITIES IDENTIFIED

List each waste at the facility with any associated P2 and innovative technology opportunities. Use additional sheets for more information.

Process - Image Processing

Raw Materials or Waste Description	Pollution Prevention and Innovative Technology Opportunities

Process - Platemaking

Raw Materials or Waste Description	Pollution Prevention and Innovative Technology Opportunities

III. POLLUTION PREVENTION (P2) AND INNOVATIVE TECHNOLOGY OPPORTUNITIES IDENTIFIED (Continued)

List each waste at the facility with any associated P2 and innovative technology opportunities. Use additional sheets for more information.

Process - Printing

Raw Materials or Waste Description	Pollution Prevention and Innovative Technology Opportunities

Process - Other

Raw Materials or Waste Description	Pollution Prevention and Innovative Technology Opportunities

IV. CONCLUSIONS AND RECOMMENDED FOLLOW UP

A. Compliance Violations and/or Issues [add regulatory references (i.e., 40 CFR 261.30)].

B. Potential P2 Opportunities and Innovative Technologies. (These are only suggestions and not regulatory requirements.)

C. Follow-up Responses to Compliance Questions Asked During On-Site Assessment. (This section should include responses to compliance questions asked during the on-site assessment that the inspector was unable to answer.)

Glossary

Best Available Control Technology (BACT)

Technology required pursuant to Part 165 on new major sources and major modifications subject to prevention of significant deterioration (PSD) requirements, which reflect best controls in use taking into account costs and other non-air quality factors.

Lowest Achievable Emission Rate (LAER)

Degree of control required pursuant to Part 173 on new major sources and major modifications in nonattainment areas; technology must be best in use or most stringent in any State Implementation Plan.

New Source Review (NSR)

Program for pre-construction review of new major sources and major modifications under prevention of significant deterioration (PSD) and nonattainment requirements.

Nonattainment

Program established pursuant to Part D of Title I requiring controls necessary to attain National Ambient Air Quality Standards (NAAQSs) in areas currently not meeting them.

Prevention of Significant Deterioration (PSD)

Program established under Part C of Title I to preserve air quality in areas already meeting National Ambient Air Quality Standards (NAAQSs).

Reasonably Available Control Technology (RACT)

Technology required pursuant to Part 172 to be installed on existing major sources in nonattainment areas; reflects controls EPA has identified in control technique guidelines (CTGs) or other guidance.

APPENDIX C1

SELECTED REFERENCES RELATED TO POLLUTION PREVENTION AND INNOVATIVE TECHNOLOGY

APPENDIX C2

ANNOTATED BIBLIOGRAPHY OF SELECTED REFERENCES IN APPENDIX C1

APPENDIX C1

SELECTED REFERENCES RELATED TO POLLUTION PREVENTION AND INNOVATIVE TECHNOLOGY

This is not meant to be a comprehensive list of pollution prevention resource materials on printing process. Rather, it contains a range of references that could be used for initial review by the inspector. Many of these documents also contain reference lists. In addition, discussion of specific pollution prevention techniques and innovative technologies, or mention of trade names on commercial products, in these documents does not constitute an endorsement or recommendation for use by EPA.

Alaska Health Program. April 1991. Waste Reduction Assistance Program. *Waste Reduction Guide: Printing Business*.

California Department of Health Sciences. May 1988. *Waste Audit Study: Commercial Printing Industry*. Prepared for the Alternatives Technology Section, Substances Control Division, California Department of Health Sciences. Sacramento, CA.

Connecticut Technical Assistance Program. August 1992. *On-Site Waste Ink Recycling*: The Hartford Courant. Hartford, CT.

Hawaii Department of Health. Solid and Hazardous Waste Branch. September 1993. Hazardous Waste Minimization News: *Waste Minimization in Action - Printing Operations*.

New York State Department of Environmental Conservation. September 1991. *Hazardous Waste Management for Printers*.

State of Montana, Department of Health and Environmental Sciences. June 1988. *The Small Quantity Generator's Handbook for Managing RCRA Wastes - Printing and Publishing*.

1995 Updated version: *Small Businesses Handbook for Managing Hazardous Wastes*.

U.S. Environmental Protection Agency. January 1976. *Environmental Aspects of Chemical Use In Printing Operations*. Office of Toxic Substances. Washington, DC. EPA-560/1-75-005 [call # PB251406].

U.S. Environmental Protection Agency. October 1983. *Summary of Available Information on the Levels and Control of Toxic Pollutants Discharges in the Publishing and Printing Point Source Category*. Effluent Guidelines Division. Washington, D.C. EPA 440/1-83-400 [call # PB92231703].

U.S. Environmental Protection Agency. January 1988. *Title III Section 313 Release Reporting Guidance; Estimating Chemical Releases From Printing Operations*. Office of Pesticides and Toxic Substances. Washington, DC. EPA 560/4-88-004b [call # PB93205979].

U.S. Environmental Protection Agency. February 1988. *Title III Section 313 Release Reporting Guidance: Estimating Chemical Releases From Roller, Knife, and Gravure Coating Operations*. Office of Pesticides and Toxic Substances. Washington, DC. EPA/560/4-88-004j [call # PB93206050].

U.S. Environmental Protection Agency. October 1989. *Pollution Prevention in Printing and Allied Industries: Saving Money Through Pollution Prevention* (Draft). ORD Pollution Prevention Office, Washington, DC.

U.S. Environmental Protection Agency. Office of Pollution Prevention. November 1989. *Case Studies from the Pollution Prevention Information Clearinghouse (PPIC): Printing*. Washington, D.C.

U.S. Environmental Protection Agency. August 1990. *Guides to Pollution Prevention: The Commercial Printing Industry*. Office of Research and Development. Washington, DC. EPA/625/7-90/008.

U.S. Environmental Protection Agency. September 1991. *Achievements in Source Reduction and Recycling for Ten Industries in the United States*. Office of Research and Development, Washington, D.C. EPA/600/S-91/051 [call # PB92137470].

U.S. Environmental Protection Agency. May 1992. *Waste Reduction Activities and Options at a Printer of Forms and Supplies for the Legal Profession*. Risk Reduction Engineering Laboratory. Cincinnati, OH. EPA/600/S-92/003.

U.S. Environmental Protection Agency. July 1993. *Design for the Environment Printing Project*. Office of Pollution Prevention and Toxics. Washington, DC. EPA 744-F-93-003.

U.S. Environmental Protection Agency. September 1993. *Control of Volatile Organic Compound Emissions From Offset Lithographic Printing*. Office of Air Quality Planning and Standards. Research Triangle Park, NC [call # PB95201422].

U.S. Environmental Protection Agency. September 1993. *Waste Minimization Assessment for a Manufacturer of Rotogravure Printing Cylinders*. Risk Reduction Engineering Laboratory. Cincinnati, OH. EPA/600/S-93/009.

U.S. Environmental Protection Agency. *Design for the Environment Printing Project: Case Study*. Design for the Environment Program; Office of Pollution Prevention and Toxics. EPA 744-K-93-001.

U.S. Environmental Protection Agency. *Design for the Environment Printing Project: Screen Printing*. Design for the Environment Program; Office of Pollution Prevention and Toxics. EPA 744-F-93-015.

U.S. Environmental Protection Agency. March 1994. *Federal Environmental Regulations Potentially Affecting the Commercial Printing Industry*. Office of Pollution Prevention and Toxics. EPA 744-B-94-001.

U.S. Environmental Protection Agency. April 1994. *Practical Pollution Prevention Techniques for Lithographic Printers*. U.S. EPA Region IX. and California Protection Agency Department of Toxic Substance Control. San Francisco, CA.

U.S. Environmental Protection Agency. June 1994. *Abstracts of Pollution Prevention Case Study Sources*. Office of Pollution Prevention and Toxics. Washington, DC. EPA 742-R-94-001.

U.S. Environmental Protection Agency. June 1994. *Printing Industry And Use Cluster Profile*. Prevention, Pesticides, and Toxic Substances. EPA 744-R-94-003.

U.S. Environmental Protection Agency. June 1994. *Summary of Focus Group Discussion with Screen Printers and Lithographers for the Design for the Environment Printing Project*. Office of Pollution Prevention and Toxics. Washington, DC. EPA 742-R-94-004.

U.S. Environmental Protection Agency. September 1994. *Cleaner Technologies Substitutes Assessment: Executive Summary; Industry: Screen Printing; Use Cluster; Screen Reclamation*. Office of Pollution Prevention and Toxics. Washington, DC. EPA-744R-94-005.

U.S. Environmental Protection Agency. *Printing and Publishing Information Packet*.

University of Northern Iowa. Iowa Waste Reduction Center. 1995. *Pollution Prevention Manual for Lithographic Printers*.

Virginia Department of Environmental Quality. September 1993. *Printers Win Through Pollution Prevention* (Video). Waste Reduction Assistance Program.

Virginia Waste Reduction Assistance Program. 1991. *Waste Reduction Fact Sheet: Waste Reduction for the Commercial Printing Industry*. Vol. 1, Issue 2.

APPENDIX C2

ANNOTATED BIBLIOGRAPHY OF SELECTED REFERENCES IN APPENDIX C1

Alaska Health Program. April 1991. Waste Reduction Assistance Program. *Waste Reduction Guide: Printing Business.*

Manual designed to assist the printing business in identifying and implementing waste reduction opportunities.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460

California Department of Health Sciences. May 1988. *Waste Audit Study: Commercial Printing Industry*. Prepared for the Alternatives Technology Section, Substances Control Division, California Department of Health Sciences. Sacramento, CA.

Study identifying waste minimization techniques available to printers. Recommendations and findings are included as well as checklists that can be used by printers to perform their own waste audits.

Available From: **California Department of Health**
Department of Toxic Substances Control
Office of Pollution Prevention Technology and Development
Document #303—Limited to existing stock
(916) 324-1087

Connecticut Technical Assistance Program. August 1992. *On-Site Waste Ink Recycling*: The Hartford Courant. Hartford, CT.

In-depth case study of how one large newspaper developed a waste ink recycling program. The project addressed product quality, waste reduction, and the economic issues involved in recycling press ink. Information on testing and comparison of virgin and recycled ink are documented. Economic information regarding the resulting cost savings is provided.

Available From: **CONNTAP**
50 Columbus Blvd., 4th Floor
Hartford, CT 06106
(203) 241-0777

Hawaii Department of Health. Solid and Hazardous Waste Branch. September 1993. Hazardous Waste Minimization News: *Waste Minimization in Action - Printing Operations*.

Newsletter featuring tips and ideas on reducing hazardous wastes generated at printing operations.

Available From: **Hawaii Department of Health**
Solid and Hazardous Waste Branch
919 Ala Moana Blvd., Rm. 212
Honolulu, Hawaii 96814
(808) 586-4373

New York State Department of Environmental Conservation. September 1991. *Hazardous Waste Management for Printers*.

Pamphlet providing information regarding hazardous wastes, waste reduction and recycling strategies, information available from the State of New York, and information on how to categorize waste streams (i.e., hazardous, nonhazardous).

Available From: **New York State Department of Environmental Conservation**
Division of Hazardous Substance Regulation
50 Wolf Road
Albany, NY 12233-7253
(212) 637-4100

State of Montana, Department of Health and Environmental Sciences. June 1988. *The Small Quantity Generator's Handbook for Managing RCRA Wastes - Printing and Publishing*.

This is a handbook developed for the printing and publishing industry to comply with RCRA requirements. The manual also provides insight into waste management strategies for minimizing waste quantities. Information was compiled through site visits to various printing shops. The handbook also summarizes the RCRA regulations that apply to printers.

Available From: **State of Montana**
Division of Wastes
(406) 444-1430

Also available is a 1995 Updated Version: *Small Business Handbook for Managing Hazardous Wastes*.

U.S. Environmental Protection Agency. January 1976. *Environmental Aspects of Chemical Use In Printing Operations*. Office of Toxic Substances. Washington, DC. EPA-560/1-75-005 [call # PB251406].

This document contains the proceedings for the conference on " Environmental Aspects of Chemical Use in Printing Operations." Papers presented covered types of printing processes, emissions regulations, and health hazards from printing effluents.

Available From: **National Technical Information Service**
5285 Port Royal Road
Springfield, Virginia
(703) 487-4650

U.S. Environmental Protection Agency. October 1983. *Summary of Available Information on the Levels and Control of Toxic Pollutants Discharges in the Publishing and Printing Point Source Category*. Effluent Guidelines Division. Washington, D.C. EPA 440/1-83-400 [call # PB92231703].

Summary of information used to develop the effluent guidelines for printers. Includes information on data gathering, water usage, toxic pollutant discharge data, and control and treatment technologies employed in printing industry.

Available From: **National Technical Information Service**
5285 Port Royal Road
Springfield, Virginia
(703) 487-4650

U.S. Environmental Protection Agency. January 1988. *Title III Section 313 Release Reporting Guidance; Estimating Chemical Releases From Printing Operations*. Office of Pesticides and Toxic Substances. Washington, DC. EPA 560/4-88-004b [call # PB93205979].

This document was designed to assist printers in completion of Part III (Chemical Specific Information) of the Toxic Chemical Release Inventory Reporting Form. General information on toxic chemicals used, process wastes generated, and examples of data needs and methodologies are included.

Available From: **National Technical Information Service**
5285 Port Royal Road
Springfield, Virginia
(703) 487-4650

U.S. Environmental Protection Agency. February 1988. *Title III Section 313 Release Reporting Guidance: Estimating Chemical Releases From Roller, Knife, and Gravure Coating Operations.* Office of Pesticides and Toxic Substances. Washington, DC. EPA/560/4-88-004j [call # PB93206050].

This document was designed to assist those using roller, knife, and gravure coating equipment in the completion of Part III of the Toxic Chemical Release Inventory Reporting Form. General information on toxic chemicals used, process wastes generated, and examples of data needs and methodologies are included.

Available From: **National Technical Information Service**
5285 Port Royal Road
Springfield, Virginia
(703) 487-4650

U.S. Environmental Protection Agency. October 1989. *Pollution Prevention in Printing and Allied Industries: Saving Money Through Pollution Prevention* (Draft). ORD Pollution Prevention Office, Washington, DC.

Intended to provide a brief introduction to pollution prevention, including what it is, how it can help save money, and where you can get additional assistance. Example technical options available to printing and allied facilities are included.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. Office of Pollution Prevention. November 1989. *Case Studies from the Pollution Prevention Information Clearinghouse (PPIC): Printing*. Washington, D.C.

Provides short (1 - 2 page) case studies of pollution prevention activities conducted at printing establishments. Details regarding costs to implement practices and cost savings are presented.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. August 1990. *Guides to Pollution Prevention: The Commercial Printing Industry*. Office of Research and Development. Washington, DC. EPA/625/7-90/008.

This guide was designed to provide commercial printers with guidelines and options to minimize both hazardous and non-hazardous wastes. Worksheets for use in developing waste minimization options for a facility are included.

Available From: **Center for Environmental Research Information**
Document Distribution Center (G-72)
26 West Martin Luther King Drive
Cincinnati, Ohio 45268
(513) 569-7562

U.S. Environmental Protection Agency. September 1991. *Achievements in Source Reduction and Recycling for Ten Industries in the United States*. Office of Research and Development, Washington, D.C. EPA/600/S-91/051 [call # PB92137470].

A collection of source reduction and recycling case studies presented to U.S. EPA as success stories. The document includes two studies related to printing processes.

Available From: **National Technical Information Service**
5285 Port Royal Road
Springfield, Virginia
(703) 487-4650

U.S. Environmental Protection Agency. May 1992. *Waste Reduction Activities and Options at a Printer of Forms and Supplies for the Legal Profession.* Risk Reduction Engineering Laboratory. Cincinnati, OH. EPA/600/S-92/003.

This research brief presents the findings of a waste minimization assessment at a printer of forms and supplies for the legal profession. The majority of opportunities to reduce waste and costs were identified for the etching process. Options for reducing solvent usage are presented.

Available From: **Center for Environmental Research Information**
Document Distribution Center (G-72)
26 West Martin Luther King Drive
Cincinnati, Ohio 45268
(513) 569-7562

U.S. Environmental Protection Agency. July 1993. *Design for the Environment Printing Project*. Office of Pollution Prevention and Toxics. Washington, DC. EPA 744-F-93-003.

A fact sheet describing the Design for the Environment Printing Project.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. September 1993. *Control of Volatile Organic Compound Emissions From Offset Lithographic Printing*. Office of Air Quality Planning and Standards. Research Triangle Park, NC [call # PB95201422].

This guide addresses reasonable available control technology for control of VOC emissions form offset lithographic printing. It is the first document in a series of at least eleven documents.

Available From : **National Technical Information Service**
5285 Port Royal Road
Springfield, Virginia
(703) 487-4600

U.S. Environmental Protection Agency. September 1993. *Waste Minimization Assessment for a Manufacturer of Rotogravure Printing Cylinders*. Risk Reduction Engineering Laboratory. Cincinnati, OH. EPA/600/S-93/009.

This research brief presents the findings of a waste minimization assessment of a manufacturer of Rotogravure Printing Cylinders. The findings indicate that the most significant cost savings could be realized recovering xylene.

Available From: **Center for Environmental Research Information**
Document Distribution Center (G-72)
26 West Martin Luther King Drive
Cincinnati, Ohio 45268
(513) 569-7562

U.S. Environmental Protection Agency. *Design for the Environment Printing Project: Case Study*. Design for the Environment Program; Office of Pollution Prevention and Toxics. EPA 744-K-93-001

First in the series of case studies that illustrates the Design for the Environment (Dfe) theme. The study describes the successful pollution reduction program of a printing company in Minnesota. The company searched for safer alternatives to managing solvents and wipes.

The case study explains the methodical evaluation of the problem leading to solutions aimed at reducing the creation of pollutants at their source.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. *Design for the Environment Printing Project: Screen Printing*. Design for the Environment Program; Office of Pollution Prevention and Toxics. EPA 744-F-93-015

Second in the series of case studies that illustrates the Dfe theme. This study describes a successful pollution reduction program at a screen printer in Wisconsin.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental protection Agency. March 1994. *Federal Environmental Regulations Potentially Affecting the Commercial Printing Industry*. Office of Pollution Prevention and Toxics. EPA 744-B-94-001.

This document presents a discussion of Federal environmental statutes potentially affecting the commercial printing industry. It provides an overview of the regulations and the specific chemicals used in the industry that may trigger particular regulatory requirements. This document is intended for information purposes only and is not an official EPA guidance document.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. April 1994. *Practical Pollution Prevention Techniques for Lithographic Printers*. U.S. EPA Region IX. and California Protection Agency Department of Toxic Substance Control. San Francisco, CA.

This document is targeted for the largest group of printers, those having fewer than 25 employees. It is an easy-to-use reference for practical information on pollution prevention techniques, technologies, and clean products that broadly apply within the industry.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. June 1994. *Abstracts of Pollution Prevention Case Study Sources*. Office of Pollution Prevention and Toxics. Washington, DC. EPA 742-R-94-001.

This document provides sources for pollution prevention case studies. It is intended to serve as a reference guide for locating pollution prevention case studies with economic information. Each source listing contains a short description of the contents, a contact name and telephone number, and a price for the document.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. June 1994. *Summary of Focus Group Discussion with Screen Printers and Lithographers for the Design for the Environment Printing Project*. Office of Pollution Prevention and Toxics. Washington, DC. EPA 742-R-94-004.

This report presents the methodology used to conduct the focus groups, provides an overview of findings, and then summarizes the findings of screen printing focus groups and lithography focus groups separately. Individual summaries of each focus group, the facilitator's guides and the "mockups" presented at the focus groups are attached as appendices.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. June 1994. *Printing Industry and Use Cluster Profile*. Prevention, Pesticides, and Toxic Substances. EPA 744-R-94-003.

This report presents a profile of the printing industry and defines a use cluster. It presents an overview of the chemicals, technologies, and processes used in the printing industry.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
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Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. September 1994. *Cleaner Technologies Substitutes Assessment: Executive Summary; Industry: Screen Printing; Use Cluster; Screen Reclamation*. Office of Pollution Prevention and Toxics. Washington, DC. EPA-744R-94-005.

The CTSA for Screen Printing Screen Reclamation focuses on the use cluster of screen reclamation and is structured to evaluate such systems. The assessment evaluates the products used in the system and chemicals that make up the products. Five individual methods and technologies through which screen reclamation can be formed are summarized.

Available From: **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460
(202) 260-1023

U.S. Environmental Protection Agency. Undated. *Printing and Publishing Information Packet*.

Compilation of information on printing and publishing.

Available From : **Pollution Prevention Clearinghouse**
Environmental Protection Agency
401 M St., SW (3401)
Washington, D.C. 20460

University of Northern Iowa. Iowa Waste Reduction Center. 1995. *Pollution Prevention Manual for Lithographic Printers*.

Handbook covering all aspects of lithographic printing and the opportunities that exist for pollution prevention and innovative technologies. Includes a bibliography, case studies, and a list of resources for further contact.

Available From: **Cathy Zeman**
University of Northern Iowa
(319) 273-2079

Virginia Department of Environmental Quality. September 1993. *Printers Win Through Pollution Prevention* (Video). Waste Reduction Assistance Program.

"Real Life" pollution prevention options for printers are highlighted in this video. A list of vendors and associations that may provide information beneficial to printers accompanies the video.

Available From: **Waste Reduction Assistance Program**
Virginia Department of Environmental Quality
Office of Pollution Prevention
P.O. Box 10009
Richmond, VA 23240-0009
(804) 762-4344

Virginia Waste Reduction Assistance Program. 1991. *Waste Reduction Fact Sheet: Waste Reduction for the Commercial Printing Industry*. Vol. 1, Issue 2.

Short fact sheet on steps to reduce waste, and the toxicity of waste streams from printers.

Available From: **Virginia Department of Environmental Quality**
Office of Pollution Prevention
P.O. Box 10009
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